ARTIFICIAL KEY TO THE COMMON SHRUBS OF THE RIVERINE FORESTS, ROYAL CHITWAN NATIONAL PARK, NEPAL

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INTRODUCTION

The usual method employed by botanists when publishing schemes for others to use in identifying species is a key providing choices between paired groupings, finally resulting in a specific determination. The usual format emphasizes taxonomic groupings, first separating the families from each other, then the genera, and then the species. This is extremely valuable in the laboratory, but is not necessarily efficient in the field. An alternative to keying taxonomic groupings is to prepare field identification keys for the species of a given life-form in a given habitat. Such ecologically based keys are rarely prepared (Allen, P. H. The Rain Forests of Golfo Dulce. University of Florida Press. 1956), but the method provides a powerful and efficient tool for field workers. In view of the ecological work being done in Royal Chitwan National Park, Nepal, by the Smithsonian Tiger Ecology Project it seems appropriate to publish this as an example of a tool for ecologists working in the Nepalese lowlands. It would be desirable to include photos of habitats and line drawings of the species. In their absence identifications should be confirmed by consultation with a named reference collection (herbarium) in the Park or at a botanical research center such as the Department of Medicinal Plants in Kathmandu.

The Park is a matrix of four basic habitats: grassland, savanna, riverine forest, and upland forest. The riverine forest, at least in the NE corner of the Park, is divided into two types: Bombax-Trewia and Mixed (composed of species often associated with Shorea robusta).

The shrub layer in the riverine forests was chosen for this initial treatment because of its importance to herbivores. These shrubs create the physiognomic structure that herbivores frequenting the forest depend on. The shrubs provide cover, camouflage for adult and young, and browse. The habitats characteristically frequented by a species are typified by their shrub layers. The needs of any one species differ, of course, diurnally and seasonally. In the study of herbivore ecology, no simple statement can be made about the utilization of shrub communities, but the identification of the shrubs in those communities is an important first step. Positive identification

and ability to distinguish between species allows for greater efficiency in field observations and, later, for correlation with research done in other locations. The importance carries over, of course, to predator research.

This key is a preliminary treatment based on field work in the Park between March and July 1976. Specimens were collected in the riverine forests south of the Rapti River in the NE corner of the Park. All the species notes are taken from observations in those forests. More field work and more collections are needed to effect a conclusive treatment. This work is intended to provide efficient identification at any season; floral or fruiting characters are used only as reinforcement for the vegetative characters. The key should be of interest to some tourists as well as foresters, wildlife researchers and botanists.

KEY

1 Leaves alternate and compound (trifoliolate or leaflets alternate).
2 Leaflets 3, clustered at end of petiole, not glandular-punctate . . . . . 1. Crateva religiosa
2 Leaflets usually 5 or more, typically alternate along petiole, glandular-punctate.
3 Leaflets typically 10 or more cm long; inflorescence about 10 cm long and broad . . . . . 2. Micromelum integerrimum
3 Leaflets not exceeding 7 cm in length; inflorescence about 2 cm long.
4 Leaflets 7 or less, typically 5 cm long; inflorescence few-flowered . . . . . 3. Murraya paniculata
4 Leaflets 13 or more, typically 3 cm long; inflorescence dense and many-flowered. . . . . 4. Murraya koenigii
1 Leaves opposite and simple.
5 Midribs sunken, mature leaves leathery.
6 Leaves sessile, subcordate at base.
7 Leaves lanceolate, acute, black-punctate below . . . . . 5. Woodfordia fruticosa
7 Leaves elliptic, obtuse, not punctate . . . . . 6. Calotropis gigantea
6 Leaves petiolate, obtuse to acute at base.
8 Leaves less than 10 cm long, lightly pubescent below with tiny glandular dots . . . . . .7. Caryopteris odorata
8 Leaves more than 10 cm long, densely pubescent below, without glandular dots.
9 Leaf margins ciliate; inflorescence branches spicate, dense, terminal . . . . . 8. Colebrookea oppositifolia
9 Leaf margins not ciliate; inflorescence branches cymose, loose, axillary . . . . . 9. Callicarpa macrophylla
5 Midribs raised, mature leaves membraneous (sometimes leathery).
10 Leaf margin serrate.
11 Leaf margins ciliate, teeth about 1 cm apart; leaf blades more than 10 cm long; flowers loosely arranged . . . . . .

. . . . . 10. Clerodendrum infortunatum
11 Leaf margins not ciliate, teeth about 0.5 cm apart; leaf blades less than 10 cm long; flowers compacted in bracteate "heads" . . . . . 11. Pogostemon benghalensis
10 Leaf margins entire.
12 Stipules absent between opposite leaves.
13 Stem terete, strongly jointed at nodes; sap clear; inflorescence spicate . . . . . 12. Asystasia macrocarpa
13 Stem flattened, not strongly jointed; sap milky; inflorescence corymbose . . . . . 13. Holarrhena antidysenterica
12 Stipules present between opposite leaves, persistent.
14 Leaves less than 5 cm long; flowers solitary . . . . . 14. Coffea bengalensis
14 Leaves more than 5 cm long; flowers in compound inflorescences.
15 Leaves glabrous; stipules united, erect . . . . . 15. Pavetta indica
15 Leaves pubescent; stipules lateral, deflexed . . . . . 16. Wendlandia heynei

NOTES

1. Crateva religiosa Forster f.
Occasional tall shrub in Bombax-Trewia Forest. Leaflets three, thin in texture. Flowers white and yellow-cream; petals clawed; stamens and style exserted. Flowers collected in March (RGT 683).

2. Micromelum integerrimum (Roxb.) Wight et Arn. ex M. Roemer (incl. M. pubescens J. Hooker)
Occasional tall shrub in Mixed Forest. Rind of fruits glandular-punctate, orange-red, collected in May (RGT 714).

3. Murraya paniculata (L.) Jack (incl. M. exotica L.)
Tall, evergreen, dense shrub, dominant in Mixed Forest. Flowers sub-solitary, white, fragrant; fruits red. Flowering and fruiting for many months of the year (RGT 698, 699).

4. Murraya koenigii Sprengel
Common tall shrub in both Bombax-Trewia Forest and Mixed Forest. Flowers white, small, collected in March; fruits collected in May (RGT 685, 748, 831).

5. Woodfordia fruticosa (L.) Kurz
Occasional shrub on edges of Bombax-Trewia Forest on moist sites. Flowers borne along drooping, unbranched twigs, collected in March (RGT 687).

6. Calotropis gigantea (L.) Dryander
Occasional shrub in open areas of Bombax-Trewia Forest. Leaves and stem fleshy. Sap white, sticky. Flowers firm, sculptured, lavender to rose, collected in March (RGT 691).

7. Caryopteris odorata (D. Don) B. L. Robinson (incl. C. wallichiana Schauer)
Common tall, slight shrub in Bombax-Trewia Forest. Flowers blue, lateral and terminal, collected in March and May (RGT 684; 716 may be distinct).

8. Colebrookea* oppositifolia J. E. Smith
Tall, spreading shrub, dominant in Bombax-Trewia Forest, forming thick undergrowth. Inflorescence drab but noticeable because of erect habit, functionally unisexual. Flowers and fruits collected in March (RGT 695, 741).

9. Callicarpa macrophylla Vahl
At time of flowering moderately low shrub; common in Bombax-Trewia Forest. Young growth extremely villous; hairs stellate. Flowers collected in July (RGT 887, 892).

10. Clerodendrum* infortunatum L.
Tall bushy shrub, dominant in Bombax-Trewia Forest. Flowers whitish, stamens and style strongly exserted, collected in March; fruits with red, accrescent calyx in May (RGT 686, 745, 830).

11. Pogostemon benghalensis (N. Burm.) O. Kuntze (incl. P. plectranthoides Desf.)
Tall shrub, dominant in Bombax-Trewia Forest. Flowers blue-lavender, collected in March (RGT 677, 750).

12. Asystasia macrocarpa Nees
Occasional shrub in Bombax-Trewia Forest. Flowers blue-lavender, collected in March (RGT 696).

13. Holarrhena antidysenterica Wall. ex DC.
Occasional tall shrub in open areas of Bombax-Trewia Forest. Sap white. Flowers white with yellow toward center, contorted, collected in May (RGT 715, 757).

14. Coffea bengalensis Roxb.
Common low shrub in Bombax-Trewia Forest. Flowers white, striking (noticeable from a distance), collected in March; fruit in July (RGT 682, 754, 888).

* Correct generic spelling as used by original author.

15. Pavetta indica L.
Occasional tall shrub in Mixed Forest. Leaf thin in texture. Flowers white, small, collected in May (RGT 717).

16. Wendlandia heynei (Schultes) Santapau and Merchant (incl. W. exserta (Roxb.) DC.)
Occasional shrub in Mixed Forest. Flowers white, very small, collected in May (RGT 707).

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